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EXAMINER

KYLE, MICHAEL J

ART UNIT

PAPER NUMBER

3676

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,353

Applicant(s)

KONO, TORU

Examiner

Michael J Kyle

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claim 8 recites the radial and axial step to be formed *at only one side of the brush seal*. Support for this limitation has not been found in the specification. Additionally, claim 10 recites that different positions comprise different radial planes. Support regarding positions in different radial planes has not been found in the specification.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. With respect to claim 9, it is unclear what the “one side of the brush seal” is. For the purpose of this examination, “one side” of the brush is considered to be any one of the axial sides, circumferential sides, or radial sides.

5. With respect to claim 10, it is unclear what the “different radial planes” are. It is also unclear if this claimed feature appears in the drawings. If it is, examiner requests clarification to more clearly identify the radial planes.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bagepalli et al (U.S. Patent No. 6,030,175). Bagepalli et al discloses a brush seal device in which splitting surfaces (48, 50, 56, 58, 60, 62, in figures 2, 3, and 4) of a plurality of split body parts (10, 12, 14, 16, 18, 20) are combined with one another and which is mounted to one of opposed component members (78) so as to seal a gap between the component members (76, 78). The examiner identifies items 48, 50, 56, 58, 60, and 62 as the splitting surfaces. In figures 2 and 3, these surfaces are only shown on one split body part (10). Because each of the other split body parts (12, 14, 16, 18, 20) are identical (column 4, line 46), they have similar splitting surfaces. The brush seal device comprises a brush seal (32) formed in a wall shape, split body parts (10, 12, 14, 16, 18, and 20) which hold the brush seal and each of which has connecting portions (26, 28, 30) that are split and that extend along the splitting surfaces wherein in each of the splitting surfaces has not only an axial step, but also a radial step. Examiner also considers portions 86, 88, and 90, on split body part 12 to be connecting portions. For the purpose of this action, only the connecting portions of split body part 10 will be referred to. The examiner refers to figure 2 of Bagepalli et al, which shows an axial step (in the direction of 42) between body parts (26, 28), and a radial step between parts (26, 28) and (30), and on the underside and end

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face of (26) and (28), along the splitting surfaces. The examiner notes that surfaces 50, 58, and 62 comprise a single splitting surface, and surfaces 48, 56, and 60 comprise another splitting surface. Furthermore, Bagepalli et al discloses the splitting surfaces (48, 50, 56, 58, 60, 62) to be formed at different positions on both sides of the brush seal (32). The splitting surfaces are at different axial and circumferential positions. Surfaces 50, 58, and 62 are at a different circumferential position than surfaces 48, 56, and 60. Surface 56 is at a different axial position than surface 60. Bagepalli et al does not explicitly disclose a circumferential clearance between the splitting surfaces of the split body parts.

8. However, circumferential clearance gaps are common in segmented seals like Bagepalli's that are used in rotary machines. One having ordinary skill in the art would recognize that a circumferential clearance exists between the split body parts of Bagepalli et al due to the thermal expansion and contraction of the segments that occurs during normal use of the rotary machine. The circumferential clearance is interrupted by the radial step (between parts 26, 28 and 30, along radial direction 38). Therefore, it is well known to one having ordinary skill in the art that a clearance exists between split body parts of a segmented seal in rotary machines.

9. With respect to claim 8, Bagepalli et al discloses the radial step to be formed at a position between a tip end and base end of a brush of the brush seal. The step is formed by the underside of 26 and 28, and their respective end faces 58 and 62.

10. With respect to claim 9, Bagepalli et al discloses the radial step and axial step to be formed at only one side of the brush seal. This side is the side radially outward from the tips of the brush seal that engage a rotary shaft.

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11. With respect to claim 10, Bagepalli et al discloses the different positions to comprise different radial planes. Examiner asserts that surfaces 50 and surfaces 58 and 62 lie in different radial planes. Additionally, surfaces 58 and 62 lie in a different radial plane than surfaces 56 and 60.

12. Claims 1, 2, 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bagepalli et al (U.S. Patent No. 6,030,175) in view of Tong (U.S. Patent No. 6,431,550).

Bagepalli et al discloses a brush seal device in which splitting surfaces (48, 50, 56, 58, 60, 62) of a plurality of split body parts (10, 12, 14, 16, 18, 20) are combined with one another and which is mounted to one of opposed component members (78) so as to seal a gap between the component members (76, 78) comprising a brush seal (32) formed in a wall shape in the longitudinal direction of a fixture portion (64) which is fixed at one end thereof, the split body parts that hold the brush seal (32) and each of which has connecting portions (26, 28, 30) that are split and that extend along the splitting surfaces. Bagepalli et al also discloses each of the splitting surfaces is composed of splitting direction extending surfaces that extend in such a direction as to split the split body parts and a longitudinal surface that extends in the longitudinal direction of the split body parts (10, 12, 14, 16, 18, 20) and that forms a step interposed between the splitting direction extending surfaces (figure 1, surfaces 58 and 50 form a step). Bagepalli et al also discloses the splitting surfaces (48, 50, 56, 58, 60, 62) to be formed at different positions on both sides of the brush seal (32). The splitting surfaces are at different axial and circumferential positions. Surfaces 50, 58, and 62 are at a different circumferential position than surfaces 48, 56, and 60. Surface 56 is at a different axial position than surface 60. Bagepalli et al does not disclose that

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each of the splitting direction-extending surfaces has shutoff means for sealing a gap between the splitting direction extending surfaces that are combined with each other.

13. Tong teaches shutoff means (52) for sealing a gap between splitting direction extending surfaces that are combined with each other (figure 4), in order to prevent leakage through a potential gap between seal ring segments. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bagepalli et al as taught by Tong in order to prevent leakage through a potential gap between seal ring segments. In addition, Tong teaches the shut off means (52) has longitudinal contact surfaces formed in a step structure (60, 62) of splitting direction extending surfaces and is constructed in a joining portion where the contact surfaces are joined with each other.

14. With respect to claims 4 and 5, Tong teaches that the shutoff means is constructed of an elastic sealing plate that extends across and shut off the gap between opposed faces of the splitting direction extending surfaces. The examiner considers the brush seal (52) of Tong, as a whole, to form a plate. Tong also teaches the shutoff means (52) is constructed of an elastically deformable plate sealing portion that is disposed between opposed faces of the splitting direction extending surfaces so as to shut off the gap therebetween and that is joined with the opposed faces.

15. With respect to claim 7, Bagepalli et al discloses a brush seal device in which splitting surfaces (48, 50, 56, 58, 60, 62) of a plurality of split body parts (10, 12, 14, 16, 18, 20) are combined with one another and which is mounted to one of opposed component members (78) so as to seal a gap between the component members (76, 78) comprising a brush seal (32) formed in a wall shape, the split body parts (10, 12, 14, 16, 18, 20) which hold the brush seal and

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each of which has connecting portions (30) that are split and that extend along the splitting surfaces, and that each splitting surface has an axial step (between body parts 26 and 28).

Bagepalli et al also discloses the splitting surfaces (48, 50, 56, 58, 60, 62) to be formed at different positions on both sides of the brush seal (32). The splitting surfaces are at different axial and circumferential positions. Surfaces 50, 58, and 62 are at a different circumferential position than surfaces 48, 56, and 60. Surface 56 is at a different axial position than surface 60.

Bagepalli et al does not disclose that sealing means are disposed between opposed faces of splitting direction extending surfaces of the splitting surfaces.

16. Tong teaches sealing means (52) disposed between opposed faces of splitting direction extending surfaces of the splitting surfaces for sealing a gap between splitting direction extending surfaces that are combined with each other (figure 4), in order to prevent leakage through a potential gap between seal ring segments. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bagepalli et al as taught by Tong in order to prevent leakage through a potential gap between seal ring segments.

17. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bagepalli et al in view of Tong as applied to claim 2 above, and in further view of Julien et al (U.S. Patent No. 5,226,683). Neither Bagepalli et al nor Tong discloses the shut off means has a sealing plate made from a super-elastic alloy material on the contact surfaces.

18. Julien et al teaches the use of a sealing plate made from a super-elastic alloy material in order to provide a seal that can be reused many time without losing it sealing effectiveness (column 1, lines 42-45). Therefore, it would have been obvious to one of ordinary skill in the art

to modify the seal of Tong as taught by Julien et al in order to provide a seal that can be reused many times without losing its sealing effectiveness

Response to Arguments

19. Examiner has changed the interpretation of the Bagepalli to include elements 26, 28, and 30 (along with 86, 88, and 90), as the connecting portions. Examiner also notes the previous Office action contained errant references to features 26 and 28 as being the split body portions in paragraphs 4 and 7, in the body of the rejections of claims 1, 2, 4, 5, and 7. This reference has been changed to identify items 10, 12, 14, 16, 18, and 20 as the split body parts, to be consistent with other references to the split body parts in the Office action.

20. Regarding claim 6, applicant argues Bagepalli does not show split body parts that hold the brush where each of the split body parts has connecting portions that are split. Applicant appears to have interpreted the rejection of claim 6 to include features 26 and 28 of Bagepalli to be the split body parts. Examiner notes that this is incorrect, as the split body parts are identified in the rejection as being items 10, 12, 14, 16, 18, and 20.

21. Additionally, applicant argues when segments 10, 12, 14, 16, 18, and 20 are considered to be the split body parts, that they do not have connecting portions that are split. Examiner notes in the specification of the present application, that no "split" is discussed on the connecting portions 4, nor is one depicted in the drawings, other than a split in the circumferential direction between the split ring parts 2 at the splitting surfaces 3. The connecting portions, or portions 26, 28, 30, 86, 88, and 90, of Bagepalli appear to be identical to this arrangement as claimed. When items 26, 28, and 30 are considered as the connecting portions, a split exists between parts 26 and 28. Examiner notes that figures 7 and 12 of the present application show the connecting

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portions 4 on both sides of the brush seal. However, these figures depict a view from an inner diameter of the seal. Examiner asserts that the connecting portions 26, 28, 30, 86, 88, and 90, would appear identical to these if viewed from the inner diameter. Examiner is considering the mounting blocks 30 and 90, as shown in figure 1 of Bagepalli, as well as portions 26, 28, 86, and 88, to be the connecting portions. Another split exists between these two portions (in a circumferential direction) at surfaces 48 and 56. This appears to be identical to the claimed arrangement of the present invention.

22. Applicant argues that the mounting block 30 does not extend along the end surfaces 48 and 50, because these surfaces are part of the mounting block. Examiner notes that in the present in the application, the splitting surfaces 3 appear to be the end surfaces of each split body part, and the splitting direction extending surfaces appear to be the circumferential end surface of an element of the split body part. Examiner considers the circumferential end surface of each segment (10, 12...) of Bagepalli to be the splitting surface. Because the end surfaces 48 and 50 extend along the circumferential end surface of each segment (10, 12...) of Bagepalli, examiner asserts they do extend along the splitting surfaces. This arrangement appears identical to that of the present application.

23. Applicant argues that Bagepalli does not disclose a circumferential clearance to be interrupted by a radial step. Examiner respectfully disagrees. As described in the body of the rejection above, Bagepalli does not explicitly show a clearance between segments (10, 12...). However, it is inherent in seals like Bagepalli's for there to be some clearance in the circumferential direction between the segments, due to thermal contraction and expansion. Examiner asserts that step formed by mounting block 30 and portions 26, 28, interrupts such a

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clearance. Examiner is considering figure 2 of Bagepalli, if view in the axial direction 42, the interruption exists when traveling in the radial direction 38.

24. Regarding applicant's argument that Bagepalli fails to show split body parts where each split body part has connecting portions, examiner notes that examiner now considers features 26, 28, and 30, to be the connecting portions, rather than 30 being the only connecting portion.

25. Applicant's arguments regarding splitting surfaces formed at different positions on both sides of the brush seal have been addressed in the body of the rejections above.

26. Applicant's arguments regarding claims 2-5 rely on the assertion that Bagepalli and Tong are deficient. Examiner respectfully disagrees. These arguments have been addressed above.

Conclusion

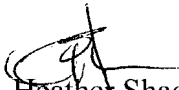
27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J Kyle whose telephone number is 703-305-3614. The examiner can normally be reached on Monday - Friday, 8:30 am - 5:00 pm.

28. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Heather Shackelford can be reached on 703-308-2978. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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29. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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